

# HOME MECHANIX

A Times Mirror Magazine

MANAGING YOUR HOME IN THE '90s

# Best Value

# Home-Improvement

# Products

*for*

# 1994

**Plus**

**Avoiding Disputes With Contractors**  
**Designing For The Future**  
**Ensuring Your Water Quality**

DECEMBER 1993/JANUARY 1994  
\$2.50 (Canada \$2.95)



**W**hile we all would like to take the purity of the water in our homes for granted, we can't. It's not unusual to find solvents, heavy metals, harmful bacteria, nitrates and many other dangerous substances in tap water these days.

That's the bad news. The good news is that you can correct virtually any water-quality problem with a filter or treatment system. Many are already on the market, and a variety of more effective units are becoming available. Innovations are making home water-treatment equipment easier to use and more affordable. Some of the newer units combine technologies that allow you to treat a spectrum of water-quality problems with a single piece of equipment.

#### WHO NEEDS WATER TREATMENT?

Whether the water in your home comes from a well, lake or reservoir, it may carry a wide variety of pollutants—some harmful and others merely unpleasant. Water supplies, especially those near industrial facilities, chemical-processing plants, dumps and farms, can become tainted

with contaminated run-off. Even if water supplied by a public water utility gets a clean bill of health when it leaves the treatment plant, it can become tainted on the way to your home. Or contamination can occur after the water reaches your home if you have lead pipes or copper tubing with lead-soldered joints.

The only way to know for sure that your tap water is safe for drinking and bathing is to have it tested. Whether your water comes from a private source, such as a well on your property, or from a public water utility, it should be checked for contaminants at least every couple of years. Definitely have your water tested if unexplained health problems, such as stomach ailments, skin rashes or high blood lead levels, crop up.

Some equipment manufacturers and marketers offer free water tests to potential customers. But the results of such tests are not always reliable. "Allowing a manufacturer to test your water may be just tempting him to sell you unnecessary equipment," cautions Gene Rosov, president of Watertest, a pioneering company in the water-testing field.

The U. S. Environmental Protection Agency (EPA) and reputable water-quality experts recommend that tests be conducted by an EPA- or state-certified laboratory (see "Testing Your Water for Purity," page 82). Independent labs have nothing to gain from either positive or negative test results.

It's necessary to screen water samples for specific pollutants in order to know which type of filter or treatment is needed. The federal Safe Drinking Water Act of 1974, amended in 1986, mandates maximum contaminant levels (MCLs) allowable for primary contaminants, which affect health, and secondary contaminants, which may affect color, taste or odor, but aren't really harmful. The table on page 80 lists both classes and the recommended forms of treatment. The EPA is currently setting stricter MCLs for a number of compounds and periodically adds new compounds to the list.

#### NEW TREATMENT TRENDS

There's a filter or other treatment system for virtually every water-quality problem. Now the trend is toward

multi-stage, multi-use filter systems. Where in the past you may have needed two or more systems to treat more than one water-quality problem, you may now need only one piece of equipment.

For example, if testing were to show that your water has dangerous levels of volatile organic compounds (VOCs) and harmful bacteria, you would need a carbon filter to deal with the VOCs and a disinfection device to get rid of the bacteria. Ster-L-Tech's Life Flo provides both remedies in one filter (see the photograph on page 83).

Lead contamination is increasingly recognized as a common problem. It can lead to brain and nerve damage, especially in children. Reverse-osmosis filters and distillation are the conventional treatments for lead, but newer equipment uses an activated-alumina medium. It absorbs any lead in the water. Most systems using this technology are cheaper than reverse osmosis or distillation and require much less maintenance.

Reverse osmosis has also been used to treat water tainted with microorganisms. But today there are new, perhaps better, alternatives.

Less expensive submicron filters have been introduced to trap microorganisms. And in another approach, low-maintenance ultraviolet light is used to kill them.

Some new filters incorporate an automatic shut-off feature, which lets you know when they need cleaning or replacement. Ametek's CCF-201 (also sold as the Sears 34201) shuts off when a preset amount of water has been processed. And the Life Flo lets you set the shut-off point based on the gallons processed or the condition of the incoming water.

Omnipure's Total filters have a dial-in mechanical day-month-year wheel to record when they were installed so you know when to change them. The filters don't shut down automatically, however.

While price and convenience are two key factors in selecting a water-treatment system, matching an appropriate technology to the specific problem is most important. Some of the newest, most promising water-treatment products are described below. All meet standards set by the National Sanitation Foundation (NSF), the premier water-related in-

dependent testing organization in the country. Remember to refer to the table "Common Primary Contaminants and Their Treatment" on page 80 to determine specific uses.

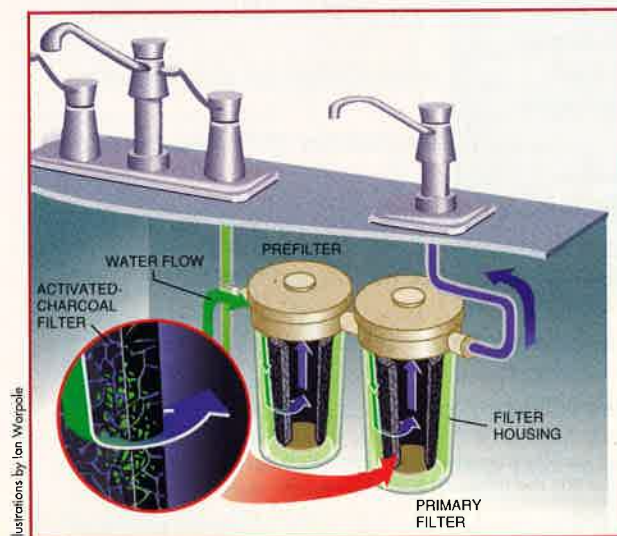
#### MULTI-FILTER SYSTEMS

Multiple-filter systems are the ideal solution for homes with two or more contaminants. In one such system, the Life Flo (\$499), water passes through a Teflon-coated plastic double coil for ultraviolet-light disinfection. It then goes through carbon-block filtration, on to granular activated carbon and back for a second pass through the UV-irradiated twin coils to kill any bacteria that treated water may have picked up in the carbon filters. Water is routed to a dedicated spigot. When the system nears exhaustion, it shuts down.

The Omnipure Omni Total II (\$329), a four-stage unit, mounts under the sink and has a dedicated spigot. The Total II features a 5-micron sediment prefilter, activated alumina to reduce lead and other heavy metals, a mechanical filter to trap bacterial cysts, and an activated carbon filter to treat VOCs, organics, and taste and

## WHAT EVERY HOMEOWNER NEEDS TO KNOW ABOUT FILTERS AND TREATMENT SYSTEMS ■ By MICHAEL CALA

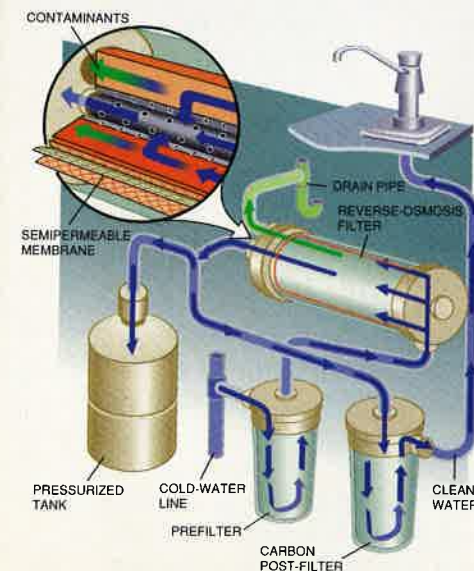
# ENSURING WATER QUALITY



Illustrations by Ian Weirpool

Under-sink activated-carbon filters tap in to the cold-water line. They typically incorporate a prefilter to remove sediment. Many units also have an activated-alumina medium to remove lead in the second-stage filtering process.

The Culligan System 201 Drinking Water Filter is a new under-sink carbon filter that is designed to reduce lead in water by 97 percent.



In a reverse-osmosis system, water enters the prefilter, then passes through a semipermeable membrane that screens out all but the smallest molecules. Contaminants, and most of the incoming water, are diverted to a drainpipe. Purified water collects in a pressurized tank. Before it's used, the water runs through a carbon post-filter to remove any organics that may have made it through the membrane.



Rainsoft's Ultrefiner reverse-osmosis unit recovers up to 40 percent of the water that runs through it. Recovery of 25 percent is considered efficient.

odor problems. According to the manufacturer, the Omni Total II can reduce lead content from 55 parts per billion (ppb) to 5 ppb or less. As mentioned previously, it doesn't have a feature to alert the consumer when it's time for a change.

Designed to remove chemical and dissolved solids, the three-stage Everpure CT2-ADC filter (\$152) handles chlorine, organics, asbestos fibers, molds, iron, manganese, sulfur and bacterial cysts. The unit features silver to inhibit bacterial growth; but if bacteria are a problem in your water, the CT2-ADC could concentrate the colonies, meaning that more bacteria will come out than went in. The filter should be backflushed periodically to control bacteria.

### ACTIVATED-CARBON FILTERS

The effectiveness of an activated-carbon filter depends on its size with respect to the amount and condition of water that must be processed. Tiny faucet add-ons are too small to be effective because water doesn't remain in contact with the activated carbon long enough. Small countertop filters are also easily exhausted.

You need a high-volume system if your water contains VOCs or has a severe unpleasant odor problem caused by sulfates or chlorine. Because VOCs can be absorbed through the skin while bathing or showering, experts recommend using a whole-house, or point-of-entry, unit.

For problems such as mercury, antimony and trihalomethanes, a point-of-use carbon filter might suffice. You can choose among countertop units and under-sink models, which tap into the cold-water line.

Virtually all under-sink filters feature a dedicated spigot for getting treated water on demand. Most come with a valve that pierces the existing cold-water line when it's attached, eliminating the need to cut pipes. That feature makes installation easy for do-it-yourselfers.

Prices range from \$160 for an under-sink model to \$1,000 or more for a whole-house unit. Most water experts recommend installing a sediment

COMMON PRIMARY CONTAMINANTS AND THEIR TREATMENT		
CONTAMINANT	HEALTH EFFECTS	REMEDY
Antimony	Nervous-system damage	Activated-carbon filter, reverse-osmosis, distillation, submicron filtration
Arsenic	Skin rashes, nervous-system damage	Activated-alumina filter, reverse-osmosis filter, distillation, water softening
Bacteria (coliform)	Gastric problems, typhoid, cholera	Reverse-osmosis filter, disinfection, distillation, submicron filtration
Cadmium	Nervous-system damage, kidney disease, possible organ cancer	Reverse-osmosis filter, distillation, water softening
Fluoride	Skeletal damage (brittle bones)	Activated-alumina filter, reverse-osmosis filter, distillation
Lead	Nervous-system damage, kidney impairment, possible organ cancer	Activated-alumina filter, reverse-osmosis filter, distillation, water softening
Mercury	Nervous-system damage, kidney impairment	Activated-carbon filter (for mercury vapor), reverse-osmosis filter, distillation
Nitrates	Blue-baby syndrome (deprives infants of oxygen)	Reverse-osmosis filter, distillation, water softening
Volatile organic compounds (VOCs)	Risk of organ cancer (esp. kidney, liver and lung)	Activated-carbon filter (whole-house)
Pesticides	Same as VOCs (above)	Activated-carbon filter (whole-house), reverse-osmosis filter
Radium	Bone cancer	Reverse-osmosis filter, distillation, water softening
Radon	Lung cancer	Activated-carbon filter, aeration
Trihalomethanes (compounds formed with mixture of chlorine and organic materials like rotting leaves)	Lung and/or liver disease, cancer, nervous-system damage	Activated-carbon filter, distillation

Claire Davis

prefilter to prevent premature clogging of the activated-carbon filter.

### UNDER-SINK CARBON FILTERS

The EPA recently installed Ametek's under-sink CCF-201 units in homes at a Superfund cleanup site near Rockford, Illinois. The CCF-201 (also sold by Sears as Model 34201; \$240) features two high-volume canisters plumbed in parallel. It has a built-in meter set to shut water flow after pro-

cessing about 1,500 gals. At that point, the filters must be changed. They cost about \$10 each.

EcoWater's Water Master (\$250) is similar in design and performance to the Ametek unit, but doesn't have the auto-shut-off feature. Replacement cartridges (two required) are \$15 each. The Kinetico Mac (\$200) has less carbon volume than both the Ametek and the EcoWater units, so it will exhaust more frequent-

SECONDARY WATER PROBLEMS*		
PROBLEM	SYMPTOMS	RECOMMENDED FILTER OR TREATMENT
High iron, high manganese	Porcelain stains, metallic taste, discolored water	Reverse-osmosis filter, distillation, water softening
Sulfates	Rotten-egg smell	Activated-carbon filter
High chlorine	Bleach smell	Activated-carbon filter
Turbidity	Cloudy appearance	Test water and seek appropriate remedy
Hardness	Soapy residue, mineral scaling	Water softening
Acidity	Pipe damage, high lead	Test water and seek appropriate remedy

\*Water with secondary problems does not pose health hazards even though it may have an unappealing taste or color. Secondary water problems can also stain clothing and leave mineral scaling on appliances.

with most countertop models, you simply install a diverter tube from your kitchen faucet to the filter. Water can then be poured on demand. The filter spigot rotates 90° for convenience. Filter cartridges process about 1,000 gals.; a four-pack of replacement cartridges costs \$35.

The manufacturer says the unit will effectively remove sediment, but we wonder at what cost to the carbon filter's efficiency. You should probably use a sediment prefilter if you have such a problem.

Advertised as effective against lead because of its activated-alumina content, The Omni Total TF-1000 (\$100) also features an activated-carbon component. Like all Omni products, this model is easy to install: route a tube to the aerator of your spigot and connect it to the unit, and you're in business. The unit has a dial-in wheel to remind you when to change the filter.

#### REVERSE OSMOSIS

In reverse-osmosis filters, water is forced through a membrane with mi-

croscopic pores. The filters remove most contaminants, including metals, nitrates, fluoride and some larger bacteria. Most reverse-osmosis units also have a sediment prefilter and a carbon post-filter to remove organics and treat taste and odor problems. Purified water is routed to a pressurized holding tank.

#### COUNTERTOP CARBON FILTERS

Countertop models, almost by definition, have less carbon volume and

therefore need more frequent filter replacement. However, they're also less expensive. If your only water problem is a slight unpleasant taste or odor caused by chlorine or sulfates, a countertop carbon filter might suffice.

The Water-On-Demand Model 6515002 from EcoWater Systems (\$79) is a low-profile Eurostyle unit. As

Claire Davis



The Ster-L-Tech Life Flo filter (left) combines an activated-carbon filter with a disinfecting UV light. General Ecology's Seagull IV system (right) uses submicron filtration to remove bacteria, sediment and some toxic chemicals.

croscopic pores. The filters remove most contaminants, including metals, nitrates, fluoride and some larger bacteria. Most reverse-osmosis units also have a sediment prefilter and a carbon post-filter to remove organics and treat taste and odor problems. Purified water is routed to a pressurized holding tank.

Among other drawbacks, reverse-osmosis units generally can treat only a few gallons a day and waste a lot of water in the process. If incoming water has high mineral content, it must be softened; hard water prematurely clogs the filter membrane. And reverse-osmosis units are relatively expensive (\$400 to \$1,000). They are, however, the best solution for water contaminated with more than one heavy metal.

The Culligan International Aqua-Clear Premier H-83C (\$849) is one of the most effective reverse-osmosis systems for removing dissolved solids and metals in water. Featuring a sediment prefilter and activated-carbon filtration, the unit mounts beneath a sink counter. The manufacturer says the Premier H-83C can process 5 to 8 gals. of water a day—high, as reverse-osmosis systems go.

Culligan's Sentry device, a liquid-crystal-display read-out unit, tells you when the filter is exhausted. The reverse-osmosis system also has a sensor that automatically halts water flow when the reservoir tank is full to conserve water. Membrane replacement costs about \$100.

#### DISTILLERS

Based on an old technology, distillation units use electricity to boil water. The vapor is cooled and the purified condensate is collected. Distillation is effective in removing dissolved solids and heavy metals, and for killing microorganisms. It is, however, ineffective against VOCs.

Distillers work slowly and their

boiling chambers need frequent cleaning to remove mineral and metal scaling. Some units employ a small activated-carbon filter between the boiling chamber and collection jug, but the carbon volume is too small to remove VOCs effectively. All distillers are designed as countertop units. The EcoWater Model 651007 (\$149) is one of the newer ones.

#### WATER SOFTENERS

The water-softening process involves a chemical reaction to remove excess amounts of calcium and magnesium. Water with these dissolved metals is called *hard*, and it leaves a film on dishes and on your skin when you wash. It also makes laundry dingy looking and leaves scaly deposits inside pipes and on bathroom fixtures. In many cases, water softening will preserve the life of filters by preventing clogging. But water softening is expensive and may not be necessary if your water is just slightly hard. It's best to ask your lab's advice on

Continued on page 89

# VAUGHAN

For people who take pride in their work  
...tools to be proud of.



© VAUGHAN

VAUGHAN & BUSHNELL MFG. CO.  
11414 Maple Ave. • Hebron, IL 60034  
815 648-2446 FAX: 815 648-4300

Available at hardware stores and home centers

## DISAPPEARING NIGHTLY AT HOMES EVERYWHERE.

Now you see it. Now you don't. Our Eclipse® range hood disappears behind your cooktop like magic. Another uncommon advantage from Broan.



# BROAN®

BR-7-3

1-800-692-7626

## WATER QUALITY

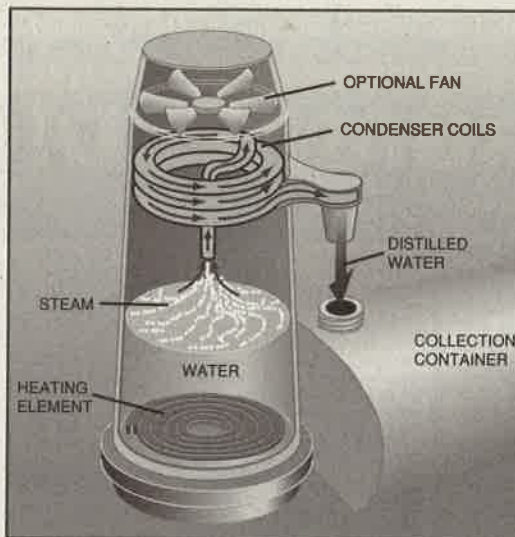
Continued from page 83

whether softening is recommended.

Most water softeners use one of two salts, sodium chloride or potassium chloride, to remove minerals from water. The process relies on one of two chemical reactions: cation exchange or anion exchange.

In cation exchange, calcium and magnesium ions in hard water are replaced by sodium or potassium ions from the softening salts. Heavy metals such as lead, barium and radium can also be reduced with cation exchange. In anion exchange, which is usually used to remove harmful nitrates from well water, negative ions in the water are replaced by chloride ions.

In old-technology timer-controlled water softeners, sodium chloride is



Distillation units use an electric heating element to boil water. The steam is directed to coils, where it condenses then drips into a collection container. An optional fan helps draw the water vapor into the coils.

flushed into the system at predetermined intervals. Now, however, demand-control electronic models measure water usage and average-out the amount of softener required.

While Culligan is the grandfather of water-softening technology, there are a number of other suppliers, including EcoWater and Rainsoft.

The Culligan Mark 59 (\$1,200) and Mark 89 (\$1,400) are two versions of the same system. The only difference is the capacity of the salt tank; the Model 59 holds 260 lbs. while the Mark 89 holds 360 lbs. This is a two-tank system, which takes up a lot of room compared with the smaller cabinet style.

If space is at a premium, consider a system like the compact Lady Kenmore Cycle Miser (\$700) from Sears. It has electronic controls to determine softening cycles, as well as a convenient battery backup to preserve settings.

### DOING YOUR HOMEWORK

With uncertainties about water quality growing everywhere, we can't over-emphasize the importance of testing the water in your home on a regular basis. Don't let anyone, especially a manufacturer's representative, sell you a treatment system you know nothing about to correct a problem you didn't know you had.

But in assessing the test results from a qualified independent lab, don't be surprised if you need more than one treatment system to ensure your water quality. Whatever contaminants may be found, do some research to determine the most effective way to correct the problems. **HM**

For additional product information, see the **HM Source List** on page 84.

## TESTING YOUR WATER FOR PURITY

**THE EPA SPONSORS** the Drinking Water Hotline (800/426-4791), staffed by water-quality experts who will answer questions and send you literature on water quality and treatment technologies. They can also provide you with the name of your state's certified drinking-water officer, who can provide the names of testing labs in your area. You can also call your state's environmental protection department or your local water-control agency.

If you use well water, have young children, live in an old house or within driving range of dry-cleaning plants, farms, or industrial areas, it's wise to test for the following: lead, VOCs, nitrates/nitrites, pesticides, coliform bacteria and herbicides.

If your municipal water or well is chlorinated, test for trihalomethanes (THMs). They are cancer-causing compounds formed when water containing organic matter is treated with chlorine. Also, test periodically for lead and other heavy metals, bacteria or other contaminants you suspect for your geographical region.

Tests can range from \$30 for a simple lead check to \$300 for com-

prehensive testing for most major contaminants. Testing labs usually include additional information on the water sample, such as turbidity (total dissolved solids), pH level and the amount of calcium, iron, nitrates, magnesium, manganese and sulfates detected.

If you're in an out-of-the-way area, consider using a mail-order lab like National Testing Laboratories, Suburban Testing Labs, or Water-test Corp. They are EPA-certified, and will perform testing (usually using overnight courier pickup and delivery) for any state in the continental United States.

If your test results come back with levels that are higher than those allowed, make sure to call the lab and have them interpret the results if they're unclear. Frequently, a lab will tell you what kind of treatment technology will remedy the problem. If something comes back really off the scale, you may want to have a second test done before investing in treatment equipment.

A final note: Water-quality experts strongly recommend that well water be tested yearly.